MOOR HOUSE
I.B.P.

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T H E N A T U R E C O N S E R V A N C Y

SCIENTIFIC POLICY COMMITTEE

Moorland Research on the Moor House Nature Reserve

The statement that follows below is the major part of a memorandum on Moor House which was sent to Captain Diver in September, 1951. The substance of the memorandum was presented verbally to, and approved by the England and Wales Committee on October 5th, 1951. Footnotes have now been added to indicate the progress of the proposed work since the area was taken over by the Conservancy on November 17th, 1951.

V.M. Conway
6.11.52.

The Moor House Nature Reserve

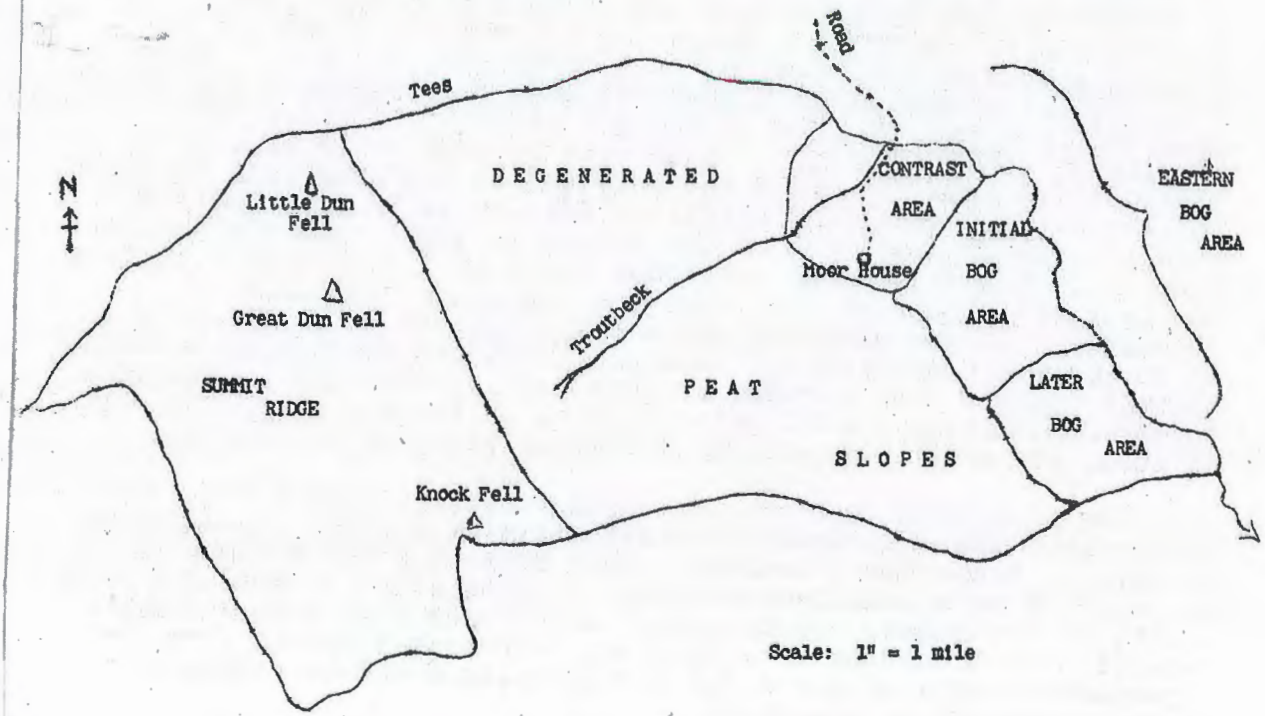
1. The present state of the reserve, and the broad aims for its treatment.

The area falls into three main sections, which are indicated schematically on the plan below, though in fact they grade into one another. They are:-

A. The summit ridge

B. The slopes and flat shoulders with degenerate peat cover

C. The eastern bog area.



A. The summit ridge

Limestone outcrops over much of this area and carries limestone grassland which is heavily grazed. Areas of peat with cotton-grass cover are found on parts of the flatter tops, and there are numerous small flushes on the western scarp slope. The Pennine Way runs along the actual ridge, and this area is obviously heavily stocked with sheep. For these reasons, it is not possible to envisage any experimental work in this part of the reserve which would involve enclosure of ground or the leaving of any equipment which might be interfered with by the public. Such work might be considered at a later stage if general conditions relating to common rights and public access were to alter, or when the Conservancy has established its value and importance both in the country generally and in this reserve.

Meanwhile there is ample scope for scientific studies of an observational character which will not affect or be affected by either sheep or walkers.

B. The degenerated peat slopes.

This, the largest in area of the three divisions, well deserves the name of "The Waste Land". It occupies roughly the ground at altitudes from 1,900 to 2,400 ft. It must at one tim have been almost completely covered by an actively growing blanket of peat. The underlying rock is all calssified as Carboniferous limestone, but in fact consists largely of sandstone, with limestone outcropping only in narrow bands. Where the limestone has remained uncovered by peat, or has been re-exposed by peat erosion, patches of limestone grassland are found. These limestone bands introduce a variant feature into the generally boggy and acid character of the land. It is a feature not found for instance in the otherwise similar peat areas of the southern Pennines, and thus gives particular interest to this part of the reserve.

As on other gently sloping or flat surfaces at high altitudes in this country, the rapidity of growth of the peat in the excessively wet climate has resulted in mechanical instability with widespread degeneration and breakdown of the bog surface and of the underlying peat blanket. Burning has no doubt played some part, and in particular it may have helped to destroy the characteristic bog sphagna which could have been important in refilling hollows and "healing" the broken bog surface. However, this general breakdown of high-level deep peat blankets must be regarded as in some sense a geological process; it is a natural erosion of soft material. It results in vast areas of dreary, unproductive land for which the only use so far attempted has been the breeding of grouse. Little or nothing is known about the rate of degeneration, nor of the stages in subsequent recolonisation. Such land lies at altitudes too high to interest foresters and does not appear to have been the subject of agricultural research. It therefore offers a challenge and an opportunity to the Nature Conservancy. Because, over the country as a whole, there is such a vast acreage of such land, there will be enormous value in attaining a full understanding of the processes that are at work, and of the effects of different kinds of treatment.

The analytical work on such land must be detailed and intensive, while the experimental treatments will be slow in yielding answers. Hence the research in this part of the reserve must be regarded as a long-term project, to be started gradually during the first few years, and developed more fully when some results, even if only tentative in character, have been obtained from the experimental work of the first few years on the less degenerate bog area next to be described.

C. The eastern experimental area.

This coincides roughly with the surface deposit of boulder clay, and indeed its character is to a large extent determined by the morainic topography. It consists of a series of rounded hillocks and ridges covered with a fairly uniform and very little eroded blanket of peat. The natural sphagnum bog vegetation has been somewhat modified by burning, but not, we hope, irrevocably. It is in this part of the reserve that we should put in hand at once the project for which in the first place the reserve was acquired, that is, the re-creation of a genuine and actively growing upland sphagnum bog.

Here and there as on the higher ground previously described, one finds patches of limestone grassland. Again, along most of the becks the Calluna-Sphagnum vegetation does not reach to the water-edge but is replaced by a zone with Juncus squarrosus, Nardus stricta, Deschampsia flexuosa, etc., on thinner peat. It is on this generally green vegetation and on the limestone grassland that all the sheep are to be found grazing.

The plan shows a suggestion for treating the eastern experimental area in three parts:

1. The "initial" bog area, in which the work of re-creating the bog surface will be concentrated for the first five years. It lies closely accessible to Moor House, but somewhat remote from the casual hikers and motorists who come up the road from time to time. Having established a live bog, it will be maintained in its natural condition for a large part of its area. We can then study its plant and animal populations, the processes of peat formation, and the characters of the bog in bulk, in particular for example its hydrography. The area will be large enough to allow also for a number of small experiments to test the reaction of the bog surface to different treatments.

Associated with the natural bog, it will also be desirable to re-establish the natural marginal fringe of scrub and small trees which would normally be found around the edges of the peat blanket in the absence of grazing animals.

2. The "later" bog area. It is planned to leave this untouched in the early stages till some results are obtained in the area just mentioned. It will thus be kept "in storage" and will allow for the application of new ideas which are sure to arise as the reserve develops.

3. The "contrast" area. While over the reserve as a whole we shall try to preserve the wet and boggy conditions which are natural in the prevailing climate and topography, it will be valuable to have a small part of the reserve where we can carry out experiments which from time to time may seem worth trying on a small scale, but which are not concerned primarily with maintaining or studying the truly "natural" conditions.

The obvious project in this connection, and the only one envisaged in the immediate future, is the treatment of a small acreage of land (50 acreas as a maximum) to the most complete drainage possible. This would give a set of microhabitats contrasting strongly with those of the saturated sphagnum bog. It would also give scope for studying the hydrography of drained peat for comparison with that of the undrained bog.

This modest experiment in drainage might be the first of a number of different treatments designed to find out how best to get maximum productivity from land of this sort

by methods other than the traditional use of fire. Low temperatures and overcast skies will always keep the productivity fairly low, but far too little attention has ever been paid to the possibilities of improvement which may come for instance from proper control of grazing intensities, controlled application of base-rich flush-waters, and so on. If the Conservancy is to fulfil its long-term aim of providing sound advice on land-use, experiments such as these, with direct practical applications as well as scientific interest, must always have some part in our scientific programme.

The setting aside of this "contrast" area will also serve a useful purpose in maintaining "good neighbour" relations with the farmers who excercise common rights on the land. They are less likely to resent increasingly boggy conditions in part of the area if another part is to some extent improved from their point of view.

The choice of the area indicated on the plan rests on its unsuitability for re-conversion to bog, and on its accessibility to drainage implements brought down the road. The former characteristic arises from the fact that mines and earlier habitations have given it a more "humanised" character, and that it is at present more heavily used by sheep, by shepherds in the course of their activities, and by fishermen and hikers, than any other part of the eastern end of the reserve.

This introductory section may perhaps be summarised, and one or two subsidiary ideas added, by speculating on the types of habitat which we might be able to demonstrate to a stranger visiting the reserve forty or fifty years hence. Among them we might hope to find:-

1. Growing blanket bog, undrained, unburnt and ungrazed.

2. Summit limestone communities, ungrazed.

3. Sub-alpine scrub-woodland of Birch, Rowan, Alder, Pine and other trees, growing in suitable localities as a supporting fringe to the blanket bog margin.

4. At least two small lakes with a good bird-population

   (a) a dammed beck with a fairly rapid inflow and outflow of water at least moderately lime-rich

   (b) a shallow nearly stagnant expanse of water on one of the flat peaty shoulders.

5. Good quality rough grazing on limestone with soil status and productivity maintained by controlled grazing practice.

6. Second quality rough grazing on drained peat.

II. Outline plans for the first five years

A. The scientific programme

1. General

(a) There should be no burning anywhere on the reserve for the next five years.(i) After that one might cautiously consider whether small, carefully controlled experiments might be useful.

(b) There will be recording and analysis of vegetation and soils. Under this head can be classified most of the work not requiring expenditure on equipment. (Laboratory equipment for work at Merlewood need not be considered in this memorandum). It may be taken for granted, without giving full details here, that records of vegetation, and if possible of fauna, will be taken before and during the experimental treatment of any particular area. Investigations will also be started, dealing with rates of erosion, stages and rates of recolonisation of eroded areas, chemical and stratigraphical characters of peats, the effect of limestone outcrops on surface vegetation and peat erosion, and other related topics.

2. Restoration of living bog-surface.

This work will be concentrated in the "Initial Bog area" (see plan). The method used in the first place will be the simple but laborious one of blocking the drainage channels in the peat at crucial points and taking steps to encourage the growth of sphagna. In addition, one hillock, already selected, will be completely fenced off, giving about 25 acres from which sheep will be completely excluded.

3. Tree-planting experiments

(a) Bog-margin scrub. One or more small plantations of mixed Birch, Alder, Rowan and other native trees will be attempted, to find out whether the original tree cover of the better-drained slopes can in fact be established. Even the eastern end of the reserve is probably not far below the altitudinal tree-limit set by the climate. This limit is however largely hypothetical and one aim of the experiments is to ascertain it. Expert advice on planting methods will be sought, and very careful examination of several possible sites will be made before the actual planting area is chosen. This means that

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(i) Discussions with the local farmers have shown that a small amount of burning will be necessary, but that the area involved will be small, and will lie well away from the eastern experimental areas.

planting will not be carried out before the spring of 1953.(i) It is intended that not more than 20 acres shall be planted in the first instance.

(b) Front-door mine refuse. An area of under two acres in the valley bottom immediately looked on to from Moor House is very unsightly with gravel and scree from old mine-workings. It would be useful to fence off this area and try out every reasonable suggestion as to possible trees, shrubs and herbs which might colonise such an area. It is quite possible that the actual mine dumps are toxic, but a shrub growth up to 6 ft. on the surrounding ground would hide them. Some species might also be found which would tolerate the toxic materials.

4. Drainage experiments in the "contrast" area.

Two different areas have been provisionally selected for this. The first is a strip of valley-bottom bog adjoining the lower end of Troutbeck, about 12 acres in extent. It will contrast with bog areas of similar size and character adjoining the Tees in the "Initial Bog" area. The second is a rounded hill summit involving 20-30 acres to be drained. This will form the drained contrast to the untouched bog on the fenced-in hill summit (see under '2' above). The observations made on these draining experiments will have their greatest usefulness if the method of draining is the same as that which is at present being widely carried out for agricultural purposes ("moor-gripping"). The areas proposed for draining have been examined by an officer of the Westmorland County Agricultural Executive Committee, and estimates obtained for carrying out this work by the standard methods. (ii)

5. Stream-gauging experiments in contrasting catchment areas

The object of this experiment is primarily to find out whether and in what way the relation between rainfall incidence in a catchment and run-off rates in its drainage channel is affected by the type of drainage in the catchment area as a whole. Two short streams have been provisionally selected. One starts in an uneroded peat blanket on the eastern margin of the "Initial Bog" area and runs down to the Tees through undissected peat; the other starts in the peat dissections bordering the hill which it is proposed to drain (see '4' above), and runs down through dissected peat into Troutbeck.(iii)

(i) This start will now have to be postponed till 1954 because of delays in procuring fencing materials and shortage of manpower.

(ii) This work was carried out by the Westmorland Agricultural Executive in July last.

(iii) The installation of the necessary weirs for run-off measurements is now in progress, with advice and financial help from the Wear and Tees River Board and their officers, and should be complete by mid-December.

6. Meteorological observations.(i)

Since much work has already been done by Professor Gordon Manley on Dun Fell and at Moor House, it is proposed to consult him as to the type of observation, methods, sites, etc., which would yield the most valuable results and at the same time could be looked after in the small number of man-hours which will be available for such work in the early stages of the reserve. In relation to '5' above, a system of rain-gauges will be needed. On this, and on the methods of measuring run-off, and river-gauging generally, expert advice will be sought, and contact will be made with the appropriate River Boards, through the medium of, or in consultation with, the Land Drainage Conference of A.R.C.(ii)

All these six items fall on to the botanical side of moorland research and might therefore perhaps, subject to the approval on broad principles by the Conservancy and its senior officers, be planned in detail and set in hand by V.M. Conway.(iii)

7. Zoological Research

Professor Cragg has undertaken to provide a summary of the work on the zoological side which he thinks could be carried out by himself and his staff and advanced students, by visits to the reserve area from Durham. This is in addition to the specific research project to be worked on by his research assistant, Mr. Brown. Professor Cragg's summary will be a separate document, not embodied in this memorandum.(iv)

8. Other research by scientists not on the Conservancy staff.

This obviously cannot be planned for by us beforehand, but we should wish to give every facility to visiting scientists, compatible with our own scientific work and with the limitations of the house. It may be worth noting some suggestions already tentatively made:

(a) Experimental taxonomy of certain appropriate plant species (v) (Professor Valentine and students).

(i) Instruments have been lent by the Meteorological Office and readings began in May. On January 1st, 1953, Moor House will become a recognised climatological station.

(ii) Consultations on these lines have taken place and much helpful and useful advice has been received.

(iii) Since August last, Mr. A. Millar, appointed as Research Assistant to Dr. Conway, has been working on the botanical experiments.

(iv) Since July, 1952, Professor Cragg has had the following students on research problems at Moor House:-

Maintenance Grant students

Jordan on Coleophora sp. Murphy on Colembola

Research assistants

Brown on Stoneflies Svensen on earthworms

(v) Already begun.

(b) Geological investigations (Professor Dunham).

(c) Productivity measurements on different vegetation types (i) (Professor Pearsall and students).

(d) Observations (i) and experiments on covering of old mining scars in the Silverband Mine area (Professor Pearsall might approve of this being included in Miss Laptain's programme).

It would be very useful, and improve the general balance of work on, and information about the reserve, if we could have a thorough floristic and ecological description of the western escarpment and summit ridge.

Many more proposals could be made, but these should form a sufficient working basis for the first five years.

(i) Already begun.